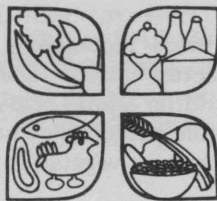


FACT SHEET

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PROTEIN

Karen Walker*

The word "Protein" comes from a Greek word meaning "primary" or "to come first." Early chemists gave protein this name because it was felt that proteins were the most important of all substances in the organic kingdom. All living things, both plants and animals, contain protein. Today we know that protein is one of six key nutrients necessary for good health in humans. Proteins, minerals, vitamins, carbohydrates, fats and water make up these six key nutrients.

FUNCTION

The main function of protein in the body is to build and repair tissues. The nutrient protein is needed by every cell in the body. As a child grows, his muscles are built from proteins. Adults also need protein to repair their muscles as well as other tissues. Proteins are also important in enzymes, which start chemical reactions so the body can use the food you eat. Protein can act as a regulating substance. Finally, protein can be used to provide energy. When carbohydrates, sugars and starches, and fats are available, however, the body will use these for energy and allow protein to be used for its other functions.

PROTEIN STRUCTURE

Protein is one of the most abundant components in the body, second only to water. Although most of the body's protein is located in the muscle tissue, some protein occurs in the blood, soft tissues, and teeth.

A great many different kinds of proteins are found in nature, and different parts of the human body have different kinds of proteins.

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For example, proteins are made up of smaller parts called amino acids. These acids act as building blocks. They join together to make a protein. There may be as many as 280 or as few as 2 amino acids that make up a protein, but most proteins in foods and in the body are made up of 12 to 22 amino acids.

NUTRITIVE VALUE OF PROTEINS

Since proteins are made up of amino acids, the nutritive value of a protein depends on the amino acids that it provides. The body can make some of the amino acids it needs, but other amino acids must come "ready-made" in foods. The amino acids that the body must have "ready-made" are called essential amino acids. There are eight of these essential amino acids.

A protein that provides all of the eight essential amino acids is called a complete protein. A protein that lacks one or more of the essential amino acids is called an incomplete protein. The body needs some of both kinds of proteins. Some foods provide complete protein while others provide incomplete protein.

Most proteins that come from animal sources (meat, poultry, fish, eggs, cheese and milk) are complete proteins, while most plant proteins are incomplete. The plant proteins, which are important source of incomplete proteins, can be combined with animal foods to provide all the essential amino acids.

PROTEIN REQUIREMENT

Everyone needs some protein each day, but the amount needed daily depends on body size, rate of growth, and individual repair and maintenance requirements. The National Research Council has set up recommended amounts of protein for each

sex and age group. The chart below lists the recommended amount of protein for each sex and age group as well as recommended amounts for consumption during pregnancy and lactation periods.

Recommended Daily Dietary Allowances for Protein		
Class	Ages (Years)	Protein (Grams)
Children	1- 3	23
	4- 6	30
	7-10	36
Males	11-14	44
	15-18	54
	19-22	52
	23-50	56
	51+	56
Females	11-14	44
	15-18	48
	19-22	46
	23-50	46
	51+	46
Pregnancy	Amount for age +	30
Lactation	Amount for age +	20

SOURCES OF PROTEINS

Most foods contain some protein, but some foods are better sources of protein than others. Animal foods, such as meat, fish, poultry, eggs, cheese and milk, which have complete proteins are the best food sources of proteins. Dry peas, beans, nuts and peanut butter which contain almost-complete proteins are also good sources. Cereal and pasta products, important sources of incomplete proteins, can be combined with animal foods to give all the essential amino acids. Eating a variety of foods that furnish proteins is important to good nutrition.

Recently a number of textured soybean products have appeared on the market. Sophisticated methods of extraction, handling and fortifying soy

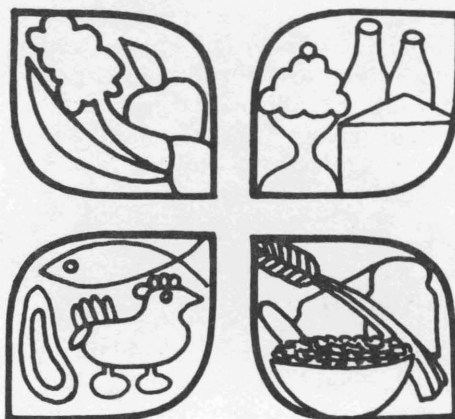
products helps them come close to meat in the kind and amount of amino acids present. Meat analogs—textured vegetable protein products—made to look, cook and taste like meat, have a low saturated fat content and almost no cholesterol. If these products are fortified with vitamins and minerals they can be close to meat in nutritive value. Although textured vegetable protein products are versatile, a better amino acid balance may be obtained by adding amino acids from other sources, such as vegetable proteins, or meat or other animal materials to texture vegetable protein products.

MEAL PLANNING

You can make sure that you get all the protein you need each day by following the Daily Food Guide for the four basic food groups.

The Daily Food Guide recommends that you eat two servings of meat group foods each day. A serving from the meat group is three ounces of lean cooked meat, fish or poultry. You can also use 2 eggs, 1 cup of dry peas and beans, or 4 tablespoons of peanut butter as a serving from the meat group. Include a protein-rich food at each meal. Milk group foods and bread and cereal group foods eaten during the day also will add protein even though they are not meat group foods.

Studies indicate that consumers spend from 30 to 40 percent of the food dollar on meat group



foods. By using less expensive cuts of meat or substituting meat alternates like eggs, dry beans and peas, nuts and peanut butter the consumer can assure adequate protein at a lower cost. Less expensive cuts of meat provide as much protein

as higher cuts of meat, but they are usually less tender. Combining high-quality animal proteins with incomplete vegetable protein or textured vegetable protein products is another way to insure good nutrition and still economize on the food bill.

In the preparation of protein-rich foods, it is best to use a low temperature and cook the foods longer. High temperatures will cause the protein to toughen and result in an undesirable product. If a less tender cut of meat or fowl is used, a moist,

heat method of cooking such as stewing, braising or pressure cooking will result in a tenderer product.

Most protein-rich foods require refrigeration to prevent spoilage. Nuts, dry beans and peas, peanut butter and some cheeses can be stored safely at room temperatures.

In order to have a well-balanced diet that promotes health, one must have protein and other nutrients in the correct amounts each day.

REFERENCES

"Almost All About Soybeans," *Food and Home Notes* (January 22, 1973), pp. 2-4.

Lockmiller, N. R. "What Are Textured Protein Products?" *Food Technology* (May 1972), pp. 56-58.

Peckham, Gladys C. *Foundation of Food Preparation*. New York: The Macmillan Company, 1966.

Reasonover, Frances L. *Your Food Budget*. College Station: Texas Agricultural Extension Service, The Texas A&M University System, 1972.

Recommended Daily Dietary Allowances. Wash-

ington, D. C.: Foods and Nutrition Board, National Academy of Sciences—National Research Council, 1973.

Robinson, Carinne H. *Proudfit-Robinson's Normal and Therapeutic Nutrition*. Thirteenth Edition. New York: The Macmillan Company, 1967.

Wilson, Eva D.; Katherine H. Fisher; and Mary E. Fugua. *Principles of Nutrition*. Second Edition. New York: John Wiley and Sons, Inc., 1967.

Wolf, W. J. "What Is Soy Protein?" *Food Technology* (May 1972), pp. 44-50.

Recommended Daily Dietary Allowances for Protein

Class	Age (Years)	Protein (Grams)
Infants	1-3	25
Children	4-13	35
Adolescents	14-18	55
Adults	19-30	60
Adults	31-40	60
Adults	41-50	60
Adults	51-60	60
Adults	61-70	60
Adults	71-80	60
Adults	81-90	60
Adults	91-100	60

MEAL PLANNING

Protein is an essential nutrient for the body. It is used to build and repair tissues, produce enzymes and hormones, and maintain the immune system. Protein is also a source of energy. The body needs a constant supply of protein to function properly. The recommended daily allowance for protein is 60 grams for adults. This can be obtained from a variety of sources, including meat, fish, eggs, dairy products, and legumes. It is important to include a source of protein in every meal to ensure that the body has enough to maintain its functions.



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